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YELLOWSTONE FISH AND FISHING

BY F. PHILLIP SHARPE



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YELLOWSTONE FISH AND FISHING

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for
Elizabeth

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FOREWORD

Yellowstone is the world's first national park established for the protection of nature. Carefully regulated fishing is permitted under objectives that are very different from non-park areas. The foremost of these is to preserve populations of native fishes and associated aquatic life in a natural environment for the enjoyment of all park visitors, that is, the protection of nature for its scenic, educational, cultural and scientific values.

A second park objective is to preserve quality angling for wild fish by restricting man's exploitation to conservative levels, maintaining fish populations that will be readily replenished by natural reproduction. Such angling requires that we distinguish between catching and killing fish. Many Yellowstone anglers release all fish or keep only one or two for a campfire meal. The park encourages catch-and-release fishing as the best means of providing an opportunity for the less than expert fisherman to catch wild trout.

The final guiding objective is to regulate man's fishing so as to not reduce essential food for native fish-eating birds and wildlife, disrupt bird nesting areas, or displace other wildlife from areas where it can be seen by large numbers of park visitors. Basically, the park is the home of wildlife which may be seen and enjoyed by man without upsetting natural relationships.

We hope this booklet will help you become familiar with the many different fishes that occur in Yellowstone and that it will add to your enjoyment of fishing here in natural waters, an opportunity that is becoming a rare privilege in this day of shrinking natural environments.

Jack K. Anderson
Superintendent, Yellowstone National Park

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YELLOWSTONE FISH AND FISHING

A century has passed since the exploratory surveys of Yellowstone that led to the setting aside of this land as the world's first national park. Picture if you can the following scenes that might have taken place during Dr. F. V. Hayden's expedition of 1871:

Hayden's party was camped on the northeast shore of Yellowstone Lake in the late summer. Where the clear, cold stream entered the lake, trout flashed at the surface as an occasional mayfly fell to the water. An osprey, frightened from the tranquillity of his wilderness nest atop a slender lodgepole pine, soared high above.

Two of the party, detailed to catch fresh trout for the evening meal, were engrossed in the beauty of the entire panorama of the lake and did not notice the broadly tapered tracks where they crossed the sandy spit at the inlet and proceeded down the beach, abruptly turning into a dense stand of timber. Neither did they realize that having entered the wilderness they had inadvertently thrust themselves into a vast natural phenomenon. A cycle, an ecological entity in which, from that time on, man would play a part.

The men were out to obtain meat for dinner. The shortly departed grizzly was out for fish, and the nest of the osprey was there because of the abundance of fish in the nearby stream. Trout were feeding on fallen insects and small crustacea. The fresh-water shrimp in turn had been feeding on smaller phytoplankters, which derived their sustenance from nutrients in the water. The nutrients tumbled in via lake fallout and by the inlet streams carrying organic and inorganic material from decaying plants and animals.

Into this complex ecosystem man had entered, adding another factor that would have to be accommodated if the system were to persist.

This happened 100 years ago. Since that time the face of America has changed drastically. Yet remote areas in Yellowstone still exist where such a scene could be duplicated. It was vividly replayed for the author on a late summer evening in 1968 while he was camped at Beaverdam Creek at the Southeast Arm of Yellowstone Lake. . . .

Returning to camp along the shoreline of the lake with a two-pound cutthroat trout for the meal my wife was preparing, I observed fresh grizzly tracks along the stream bank. Instinctively I looked around. Over the marshy entrance of the Yellowstone River toward Trail Creek an osprey was circling. In the quiet water native cutthroat trout were beginning to rise for their evening meal. Men had been able to fit into the system without disabling it.

How had the system been preserved without complete alteration so that 100 years later, when millions of people were using the dwindling wilderness, Hayden's Yellowstone experience could be duplicated? To answer that question is the purpose of this booklet: to tie together the many facets that may affect a single natural population, to identify the fishes of Yellowstone and their place in the natural ecosystem of Yellowstone National Park.

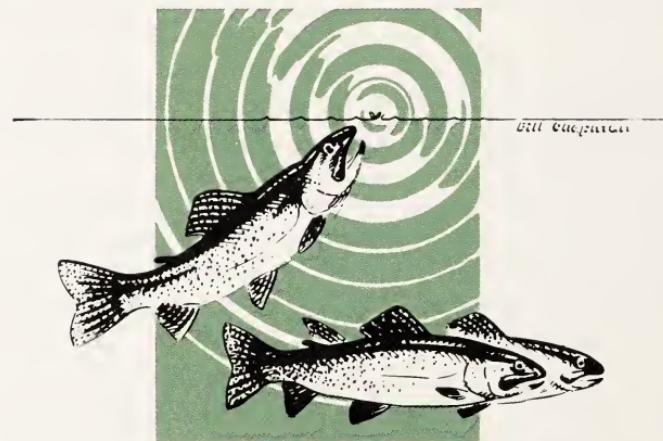
THE FISHERY

The need to conserve this unique area was recognized with the establishment of Yellowstone as the world's first national park in 1872. But during the early years many mistakes were made, some due to a failure to foresee the limits of the resource, others made in good faith at a time when the science of ecology was new, untested.

In more recent years man has begun to understand that all components of a community in nature are necessary to the working of the whole, from the top carnivores—the grizzly and the osprey—down through the lowest forms of life to the land itself. This principle has been applied to the program of managing the park. Partly through wise management, partly through good luck most of Yellowstone today is as it was during primitive times: its streams still run cold and clear, and trout fishing is unequaled.

Yellowstone Lake and River Basin, from the Upper Falls to the top of Two Ocean Pass, contains perhaps the largest population of native cutthroat trout in this hemisphere. The genetic constitution of this distinct species is undiluted and can remain so indefinitely with proper management. Isolated populations of cutthroat in the park are so pure that they have been called "museum specimens in museum streams."

The Yellowstone fishery today is comprised of both native and introduced fish, both sport fish and species whose value to park visitors is indirect. High quality angling—the opportunity to catch (and release) rare native species in a wilderness environment—remains in much of the park. Perhaps just as important the fishery provides essential food for fish-eating birds and wildlife, all of which may be seen and enjoyed by visitors.



HISTORY

Long before the Hayden and Washburn expeditions explored this country, the Yellowstone fishery must have been utilized by aboriginal inhabitants of the region. Projectile points found along the lakeshore and throughout the Yellowstone Plateau indicate extensive early use of what is now the park by hunter Indians, but how much they actually fished is unknown. More recent and direct evidence of fishing includes rocks arranged geometrically in shallow water near Bridge Bay—thought to be remnants of an ancient fish trap used by the occupants of a nearby campsite.

A legend of recent Shoshoni Indians tells of how the cutthroat trout, typical of the Pacific drainage, came to be in waters on the Atlantic side of the Continental Divide. It describes the formation of the Yellowstone and Snake River systems, with their common trout species, as resulting from the accidental overturn of an old lady's fish basket.

The explorations of the early 1870's documented the great abundance of fish in this country. The establishment of Yellowstone as a national park was the first step in preserving the area; it also provided the impetus for a program of keeping accurate records of the fishery. Before the turn of the century scientific studies were being conducted on the park's aquatic inhabitants. The U.S. Army, caretaker of the park from 1886 until the National Park Service was established in 1916, is a good early source of records.

ERAS OF FISHERY MANAGEMENT

Fishery management in Yellowstone generally followed the trends of conservation and management practices employed elsewhere in our nation. Beginning in the early 1800's history of the fishery can be divided into three distinct eras: from the first settlement to the early 1900's—a period of exploitation; from this time until the end of World War II—an era of stocking and protection; and from the late 40's to the present—the era of habitat maintenance, regulation, and preservation.

Fortunately in the early days the waters of Yellowstone were remote, because transportation was slow and vacations short. Consequently the park was not as adversely affected by prevailing exploitive attitudes as were many other more populated areas.

However, despite its geographical remoteness and management oriented toward preservation, Yellowstone did not fully escape some irreversible mistakes. Fish stocking errors were particularly serious. They resulted in the establishment of undesirable exotic species which in some cases competed with native fish, eliminating them from some of the park's waters. In other cases the introduced species interbred with native strains, producing hybrids or otherwise diluting the genetic makeup of the native population.

HATCHERY OPERATIONS

In 1901 the Army established its first fish hatchery at West Thumb. Eggs taken from Yellowstone Lake cutthroat trout were hatched, and fry were returned to the lake. It was fortunate that the spawners were taken from the same lake in which the fry were stocked; thus any mixing of genetic strains was limited to the cutthroat populations within the lake.

In 1903 the Bureau of Fisheries established a fish hatchery at Lake. The purpose was the same as the original West Thumb hatchery: to assist nature with a job she had been doing adequately for thousands of years. That was the thinking of the time.

Additional eggs were collected for shipment throughout the United States and to several foreign countries. During the period of hatchery operation from 1903 to 1953 more than 817 million cutthroat eggs were collected from Yellowstone Lake! Other hatcheries were built at Grebe Lake for collection of grayling eggs and at Trout Lake for rainbow trout.

In 1930 there were as many as six egg collection stations on Yellowstone Lake alone. Upstream migrating fish were trapped in weirs, stripped of their eggs, and returned to the stream. Many special problems were associated with this operation. Two 33-foot cypress boats were used to pick up eggs and to transport food and supplies to the isolated crews on the lake. The fishy smell of the traps attracted bears, always a perplexing problem to the workers. The use of barbed wire, electric fences, and guard dogs all proved ineffective against the persistent bears, and constant vigilance was required until the eggs were picked up by the transport crew.

FISHERY RESEARCH

In 1949 the National Park Service requested the assistance of a team of fishery research biologists from the Fish and Wildlife Service to act as consultants. Their job was to determine what influence egg taking operations were playing in the ecological balance of the lake fishery. They remained in the park until 1961, but as early as 1953 they had learned that egg taking and restocking was not necessary to maintain the fishery. In fact they found the excessive removal of eggs was detrimental to natural reproduction.

In 1953 the hatchery was officially closed. Yellowstone Lake and the entire park fishery were returned to their original self-sustained basis. Since that time there has been only one experimental plant of fish in Yellowstone Park—a token stocking of 10,000 grayling fry in Ice Lake in 1961.

Once it was learned that artificial stocking was unnecessary, the objective of the Fish and Wildlife Service program was changed. They now had to determine the numbers of fish anglers might take without damage either to the trout population or to the native predatory animals dependent upon

trout for survival. The value of streams tributary to Yellowstone Lake and their part in maintaining fish population in the lake through natural reproduction became apparent. Studies to determine the size of spawning runs, the degree of egg mortality, and the resulting fry survival were of special significance because of the natural conditions which still prevailed in the streams.

The biologists discovered that cutthroats and their progeny in each inlet stream to Yellowstone Lake have a strong homing instinct, returning to the same stream each time they spawn. They found that Yellowstone cutthroats matured and spawned for the first time at an average age of four years, that 48 percent of the spawners died during the rigors of spawning, and that few fish lived over six years. They also discovered that only a fraction of those spawning the first time returned the following year, and only a few returned on alternate years or during their last year of life.

The biological team found that other predators besides man played an important part in utilizing the cutthroat trout. The colony of white pelicans on Molly Islands in Yellowstone Lake probably consume 300,000 to 400,000 fish per year. Osprey, mergansers, and other water birds, and mammals such as otter, mink, and bear eat large numbers of fish.

MORE INTENSIVE MANAGEMENT

In 1961 the fishery research workers were replaced by a team of fishery management biologists from the Bureau of Sport Fisheries and Wildlife. Fishery work continued and was expanded to include all park waters, with the application of management practices based on research findings. Fishing regulations, limits, and seasons were revised toward maintaining a fishery that would provide enjoyment for increasing numbers of park visitors, yet continue to support the birds and other animals dependent upon it.

Investigations were expanded to include biological surveys of the more than 300 lakes and streams in the park. The species composition and abundance of fish populations, the physical and chemical characteristics of the water, and the makeup of available fish food were all recorded. A start was

made in assessing fisherman access and use of park waters, and from these studies those areas of high priority for intense management were selected. The surveys are far from complete today, but a beginning has been made.

Steadily increasing fishing pressure made more intensive management imperative. In 1895 during the first era of fish management there were only 5,438 visitors to the park; in 1943 toward the end of the fish stocking era there were 64,144 visitors. By 1969 when visitors numbered over two million and there were over 370,000 man-days of fishing in the park, the ecosystem was beginning to be strained, and more restrictive fishing regulations had to be set.

Although fishing is one of Yellowstone's popular activities, it does not attract all who come to the park. Thousands more get satisfaction from observing park wildlife, many of which are sustained by the great numbers of fish. In the natural surroundings of a national park the angler does not resent the activities of his competitors—the pelican, osprey, and bear. He finds these animals to be an integral part of his experience while enjoying his sport along a stream or lake.



ECOLOGY

Ecology is the relationship of organisms or groups of organisms to their environment. Let us consider one organism, the cutthroat trout, and some of the factors that influence this fish.

Food relationships may be visualized in a three-tiered triangle. The producers are on the bottom or supporting level; at mid-level are the cutthroat consumers; and at the top are the more specialized predators.



The top of the triangle consists of a number of animals that prey on cutthroat trout including water birds, mammals, parasites, and man. On the bottom tier are the many forms of plant and animal life that make up the cutthroat's diet. Among

them are free-floating microscopic organisms, aquatic and terrestrial insects, and various kinds of forage fish. Basic to this ecosystem are the sources of energy which support the triangle—sunlight and inorganic nutrients of the lake. All organisms in a food triangle are interrelated; a change in population for any one of them will indirectly or directly affect all the others. For example, if fishing (predation) by man were reduced or eliminated, the cutthroat population might increase in numbers or average size, but the population probably would not increase measurably in total weight, for other predators would have a better chance of capturing more fish. The result



might be an increase in numbers of the many native predators of cutthroat—pelicans, otters, etc.—in proportion to the total mass of fish previously harvested by man.

If water birds were somehow prevented from preying on the fish population, one effect might be the disappearance of the parasite tapeworm *cordiceps*, which is directly dependent upon water birds for part of its life cycle.

Predator and prey relationships, while extremely critical, are just one of many components of the Yellowstone Lake ecosystem. Others include the quality of the lake water, availability of fish spawning sites, nesting sites for water birds, and wilderness habitat for grizzlies and osprey. Even in a national park man can and has altered some of these ingredients, disrupting what has been called “the balance of nature.”

Modern research has demonstrated the enormous complexity of any natural ecosystem. Today in Yellowstone, park managers apply research findings to achieve the goal of providing human use and enjoyment of the park without impairing its natural values.



THERMAL ACTIVITY

In Yellowstone there are several areas where fish and fishing are closely associated with thermal features. The Firehole River derives much of its volume from hot springs and geyser overflow as it meanders through the Upper, Middle and Lower Geyser Basins on its way to its junction with the Gibbon. Heated waters are introduced into the Gibbon River from Terrace Springs and numerous hot springs and geysers along its banks. Other sites where hot water enters trout streams are Boiling Springs into the Gardner River, the Yellowstone River above and below the falls, Shoshone Geyser Basin runoff into Shoshone Creek, the Nez Perce drainage, and Yellowstone Lake at West Thumb.

Studies of the Firehole in 1965-66 revealed trout are not adversely affected by the hot effluent and can avoid immediate areas of danger. Rainbow trout and brown trout have been captured within a few feet of the entrance of Ojo Caliente Spring of 200°F. Heated water entering streams is quickly dissipated into the cold stream water. The result is a slight rise in the temperature gradient which is not harmful to trout until it reaches an excess of 80-85°F. Brown trout captured in the Firehole River one-half mile below Old Faithful Geyser are vigorous and have an excellent body condition.

Aquatic food organisms benefit from the increase in temperature caused by introduction of water from thermal springs. They have a longer growing season, usually at a more optimum temperature.

Witch Creek, originating in Heart Lake Geyser Basin and flowing into Heart Lake, is one case where high temperatures have excluded trout, at least during the warm summer months. However, where the stream enters the lake a rich community of aquatic organisms has become established. Here the fisherman can stand in the warm stream water and comfortably fish beyond the delta, an active feeding ground for trout.

Water conditions constantly change in the park, but not always as dramatically as they did following the 1959 earthquake when the behavior of several thermal features changed dramatically. A more recent natural change occurred in South Twin Lake. In 1962 cutthroat trout and grayling were collected from the lake, and water analysis indicated it was a suitable lake for fish. Subsequent samples taken in 1966 revealed the absence of all fish life and a radical change in water chemistry that probably resulted in elimination of the fish population. The cause of the lake's alteration never became known.



PARASITES

The incidence of parasites in cutthroat trout is indeed great, but their presence and influence in the ecosystem has been overrated. The fish tapeworm, *Dibothriocephalus cordiceps*, is the internal parasite most often found in trout in Yellowstone Lake and the one most often observed by fishermen.

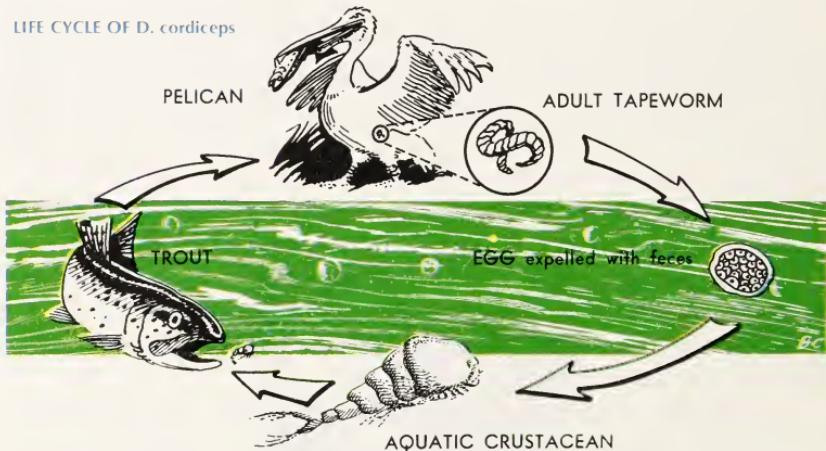
The tapeworm, first recorded in 1871 by the Hayden Survey, is just as much a native to Yellowstone as are the cutthroat, osprey, and bear. Its role in the Yellowstone ecosystem has been studied over the years, but the question as to what extent it infects and harms the cutthroat population of the lake has not been fully answered.

Most people are aware that all species of animals, including humans, harbor some form of parasite. Parasites often serve as a check over population numbers, culling out the weak, ultimately building a stronger population. All wild fish populations are infested with parasites, from the bass tapeworm in the South to the *cordiceps* in Yellowstone Lake trout. In 1964 it was estimated that 75 percent of the trout in Yellowstone Lake were infested.

A question frequently raised is whether or not the tape-worm can infect humans who have eaten parasitized trout caught in Yellowstone. Although they may seem repulsive, the parasites pose no real threat to the person who eats the fish. Infections of humans by *D. cordiceps* are extremely unlikely. Suspicion of human infection probably has arisen from confusing the larval form of the cordiceps tapeworm with *D. latum*, the broad tapeworm of man. The latter form is found in fishes of the pike family and can infect man but does not occur in Yellowstone.

In the 1930's an investigator voluntarily ingested 14 Yellowstone trout tapeworms ranging from 7 mm to over 70 mm in length. Subsequent examination failed to show any tape-worm development in the volunteer. For the modern fisherman who may not care to repeat this experiment, thorough cooking of his trout will eliminate even the remotest possibility of infection.

LIFE CYCLE OF *D. cordiceps*



LIFE CYCLE OF *D. cordiceps*.—The adult stage occurs in pelicans, ospreys, gulls, and other fish-eating birds—the primary hosts of the tapeworm. Tapeworm eggs are released in the feces of the birds and hatch in the water as a free swimming stage. They are eaten by small aquatic crustaceans. As crustaceans are an important source of food for trout, the parasites enter a fish when it eats. The tapeworm larva then passes through the wall of the fish's stomach and forms a cyst.

Tapeworm cysts in trout mainly occur around the stomach but also infect other internal organs and flesh. While encysted the tapeworms evolve into a flatworm stage, break out of the cyst, and either enter the body cavity or move into the body muscles of the trout where they may appear as a conspicuous lump under the trout's skin. Fishermen often discover the worms around the intestines when they are cleaning their catch. When an infected trout is eaten by a water bird, the tapeworm is freed and attaches to the intestinal tract of the bird. The cycle has then been completed.

Certainly a heavy tapeworm infestation is harmful to individual trout. Tapeworms can cause considerable damage to internal organs, lead to reduction of vigor of individual fish, and possibly affect reproduction. But control of the parasite would be extremely difficult. More important, removal of this natural element could lead to a disruption of Yellowstone's aquatic ecosystem.

The same species of tapeworm found in Yellowstone Lake also occurs in trout of the Upper and Lower Yellowstone River, Riddle, Heart, and Squaw Lakes, and no doubt in other areas of the park where water birds and cutthroat trout are associated. They are common in other parts of the northern Rockies, but fishermen are not as aware of them. Dislike of the parasite is purely psychological, and discarding parasitized fish is wasteful.

External Parasites—Two important external parasites, the fish louse (*Salmincola* sp.) and the freshwater leech (*Piscicola* *salmositica*), are most often observed by fishermen early in the season.

The leech is dark brown and about one inch long when extended. It attaches to the body of the trout by means of a suction type mouth equipped with rasping mouth-parts. The leech is most numerous during the cutthroat's June spawning run. It usually drops off shortly after the fish is removed from water.

The fish louse, or parasitic copepod, is a small crustacean usually found attached behind a trout's fins. Like the leech it is commonest in June and it also eventually drops off after the fish has been removed from water.

There are several other parasites of fish in Yellowstone but they are seldom seen. None are harmful to man.

NATIVE AND INTRODUCED FISH

High mountain streams like those in Yellowstone rarely support many kinds of fish. Only 11 species of native fish live in the waters of the park's 2.2 million acres. Due to promiscuous planting in the early years, five exotic species including rainbow, brook, lake, and brown trout have been added to the park's fish fauna. In all there are 16 full species (including two forms of cutthroat) and one hybrid, making a total of 18 forms. Other additional undiscovered species of minnows may well exist in certain geyser areas and warm streams.

Lava flows of Pliocene times over 12 million years ago left the Yellowstone Plateau barren of fish. Waters flowing from the elevated plateau invariably drop over falls which form barriers to upstream fish migration. And yet over the millenia fish migration has occurred, and this plateau country has been repopulated with the 11 native species noted above.

Yellowstone Falls is an important barrier which has spared Yellowstone Lake from having a diverse fish fauna. The 109-foot upper falls 12 miles downstream from the lake and the dividing headwaters of the Upper Yellowstone and Snake Rivers on the Continental Divide at Two Ocean Pass separates Yellowstone Lake's drainage system into an isolated basin.

Cutthroat trout on the Divide's east slope have evolved into the Yellowstone Lake form, while the Snake River form has developed on the west slope of the Divide. There seems to be little intermixing of the two, even though the possibility exists of movement back and forth over the shallow, marshy area atop Two Ocean Pass.

Other barrier forming falls in the park include Hellroaring, Gibbon, Bechler, Cave, Osprey, Lewis, and Tower Falls. Many of these are not complete barriers but they do deter mixing of fish populations.

Ichthyologists are particularly interested in the cutthroat trout of Yellowstone Lake. This large lake with its many tributaries and genetically pure species presents a great opportunity for studies of fish evolution, for here the cutthroat seems to be undergoing some observable changes. Recent studies indicate the Yellowstone cutthroat may have developed into several distinct individual races or varieties in different parts of the lake. These differences may have resulted from continued exposure to differing environmental influences and to reproductive isolation of the several fish populations.

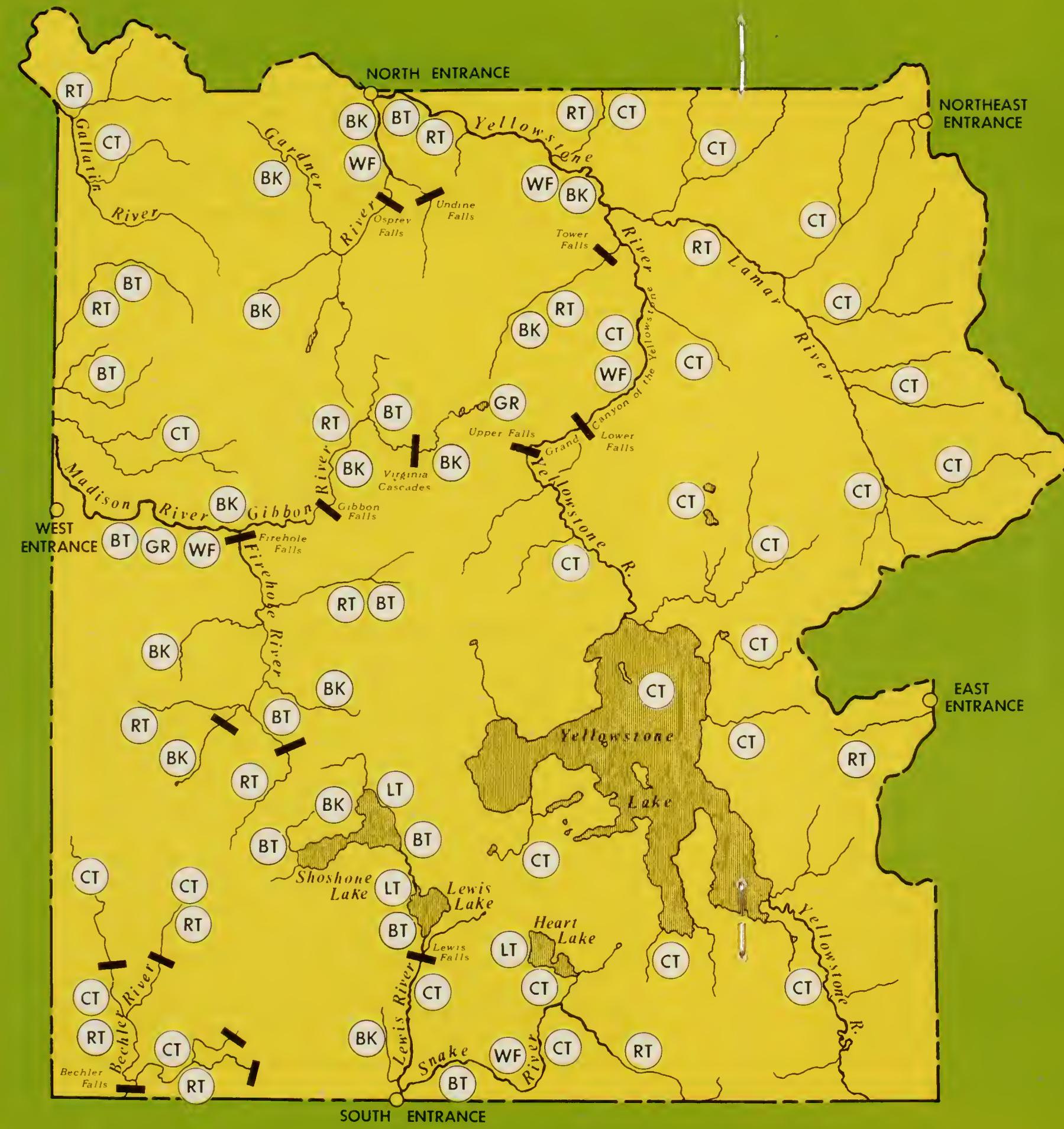
Yellowstone Lake and tributaries now contain only five species of fish, three of which have been introduced by man—the redside shiner, the longnose sucker, and the lake chub. The only other exotic species in the lake drainage were brown trout in Duck Lake, and these were eradicated in 1967. Native species are the longnose dace, found only in limited numbers in tributary streams, and the Yellowstone cutthroat trout, which makes up most of the basin's fish population.

EFFECT OF INTRODUCED SPECIES

Yellowstone's native fish are limited to those species that flourish in cold water. Warm-water fishes are not present despite two early abortive attempts to establish black bass. Yellow perch introduced into Goose and Feather Lakes existed for many years. Apparently conditions were unfavorable in Feather Lake, for the perch disappeared; however, they continued to survive in a stunted form in Goose Lake until 1938 when they were removed by chemical treatment to prevent the possibility of their spreading to other waters. The eradication of the perch was fortunate as they are both prolific and readily adaptable to cold-water environments. During fishery surveys of Goose and Feather Lakes in 1966 there were no indications that the perch populations persisted.

Landlocked salmon planted in Yellowstone and Duck Lakes in 1908 have not been recorded since. Mountain whitefish were introduced above Yellowstone Falls in 1889 but none survived. Rainbow trout first planted above the falls in 1908

YELLOWSTONE FISH DISTRIBUTION MAP



Legend

CUTTHROAT TROUT



RAINBOW TROUT



BROOK TROUT



WHITEFISH



GRAYLING



LAKE TROUT



BROWN TROUT



NATURAL BARRIERS



probably survived but were subsequently hybridized into the dominant cutthroat trout population.

The introduction of exotic species now thriving in Yellowstone is unfortunate, for they detract from the natural integrity of the park. In some cases they have filled an environmental niche that may not have been formerly occupied. But in others they compete directly with native fish for food and spawning sites. For example, brown trout, one of the most predacious of trout, have displaced native cutthroats throughout the Madison and lower Gibbon drainages. Rainbow trout have hybridized with cutthroats wherever they occur together resulting in the loss of a pure native strain. Brook trout fill a niche in some cold headwater streams forcing out other species. Blacktail Ponds and Blacktail Creek, originally populated with cutthroat, are good examples.

The five exotic fishes present in Yellowstone are well established and their removal appears to be impractical. Park management is now aligned toward encouraging native species in as many of their original waters as possible, and the absolute prevention of further encroachment from exotics. Today the introduction or transplanting of a non-native species within any national park is prohibited. Whenever feasible the Yellowstone cutthroat will be re-established in its original habitat as part of the policy to restore natural ecosystems in all natural areas of the National Park System.

SPORT AND FORAGE FISH

Seven species of fish in Yellowstone—cutthroat, rainbow, brown, lake, and brook trout, grayling, and whitefish—are pursued by anglers for sport. The trout of course are the most important in the sport fish group and of these the cutthroat is the most sought after fish in the park.

Nine Yellowstone species can be classified as "forage" fish. This name comes not from their feeding habits, but because many are an important food for sport fish. Most species of sport fish would not thrive in the absence of forage fish. A case in point are the lake trout populations that depend upon forage fish for a major portion of their diet. Water birds and other fish eating animals make no distinction in their choice between sport and forage fishes, utilizing whichever is available as food.

FISHING IN YELLOWSTONE

You may well find fishing in Yellowstone to be the most rewarding outdoor experience you have ever encountered. Carefully regulated fishing is permitted under objectives that are different from non-park areas. In this national park the goal is to preserve native fish and associated aquatic life in natural environments and to provide the opportunity for quality angling for wild fish. You won't catch a hatchery-bred fish here! But you may experience the kind of wilderness fishing described in the opening pages of this booklet. Few places today can offer as much.

Most light weight spoons, wobblers, and spinners are effective with Yellowstone trout. Combinations of red and white, or bright orange spoons, one-fourth ounce or less, are high on the list of preference for both anglers and fish. Spoons are good for trolling and casting in Yellowstone Lake in June and July. Silver or gold size #1 and #2 spinners with a red, white, or yellow color combination on the tail spinner are perhaps the most successful lures, both in streams and lakes on a year round basis. Spinners are good early in the season during snow melt and high water on Slough Creek, Gardner, Lamar, and the Lower Yellowstone Rivers.

Dry fly fishing begins to pick up by early July when most streams in the park have cleared. The stonefly (locally known as "salmon fly") hatch is on then, and stonefly imitations can be most effective during the week or so when these insects are flying.

By late July and through August and September both wet and dry flies provide fine fishing on most waters in the park. Grasshopper imitations and bright patterns such as the royal coachman are good all around dry flies, but the best fly fishing is had when the angler can match a local insect hatch. Woolly worms and muddlers are favorite wet fly patterns throughout the season. Perhaps the best advice is to seek fly pattern suggestions from one of the many excellent fishing shops in the surrounding communities.

Lake trout are best caught in Lewis Lake, June through Labor Day, by trolling deep with large, brightly colored spoons. When cold weather begins in late September and October, lake trout can be caught in the shallow shoal waters of Lewis, Heart, and Shoshone Lakes on a fly rod with white millers and woolly worms.

Brown trout fishing is excellent in the Firehole Canyon, Madison, and Lewis Rivers in late fall when spawning browns begin to concentrate.

Due to the small mouth on the grayling and whitefish, these species require flies with hooks smaller than #10. The black gnat and gray hackle-red are good flies for both species.

For those having the time and energy some of the most rewarding experiences can be found in the more remote areas. Well-marked foot trails provide access to most of Yellowstone's backcountry waters. Hellroaring and Cache Creeks, the Falls River, and Riddle and McBride Lakes are some of the more accessible waters off the beaten track. The more enthusiastic backcountry fisherman will want to fish in the beautiful and wild areas, such as Seven Mile Hole on the Yellowstone River, the lake and streams on Two Ocean Plateau, and in the Bechler Country. These isolated waters are seldom fished; they can provide an unequaled fishing experience for those willing to exert the extra effort necessary to visit them.

Angling here requires distinguishing between catching and killing fish. Many Yellowstone anglers release all fish or keep only enough for a campfire meal. The park encourages catch-and-release fishing in order to preserve an opportunity for the less than expert fisherman to catch wild trout.

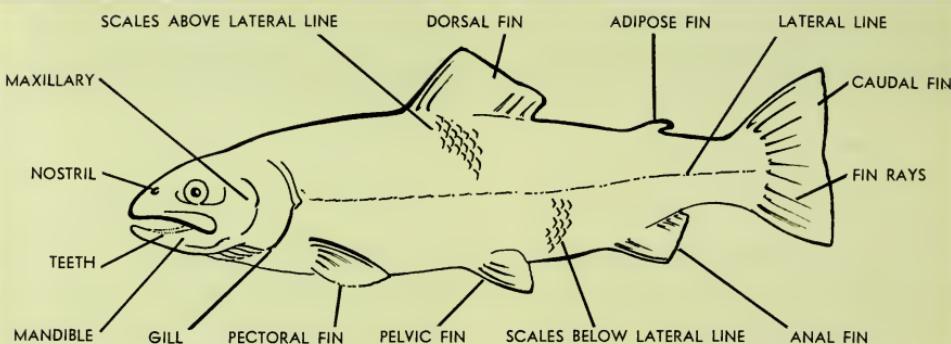
Fishing in Yellowstone National Park will be rewarding, whether you are a novice or an expert, whether you catch fish or not. Try it! You may agree, like so many in the past, that your fishing experience here can never be surpassed.

KEY TO THE FISH FAMILIES OF YELLOWSTONE

- 1a. Adipose fin present.....
TROUT, WHITEFISH, GRAYLING p.31
- 1b. Adipose fin absent..... 2
 - 2a. Body with scales; fins usually without spines 3
 - 2b. Body without scales; fins with spines.....
SCULPINS p.48
- 3a. Mouth with thick fleshy lips, sucker-like..SUCKERS p.40
- 3b. Mouth with thin lips, not sucker-like...MINNOWS p.43

KEY TO THE TROUT, WHITEFISH AND GRAYLING OF YELLOWSTONE

- 1a. Dorsal fin shorter than head, not high, with fewer than 15 rays..... 2
- 1b. Dorsal fin longer than head, high, with more than 15 rays..... ARCTIC GRAYLING p.38
 - 2a. Mouth large; more than 100 scales in lateral line..... 3
 - 2b. Mouth small; less than 100 scales in lateral line..... MOUNTAIN WHITEFISH p.39
- 3a. Body with dark spots on light background..... 4
- 3b. Body with light spots on dark background..... 6
 - 4a. Deep red slash on each side of the throat along the underside of each jaw..... CUTTHROAT TROUT p.32
 - 4b. Deep red slash on each side of throat absent..... 5
- 5a. Spots scarcely developed on caudal fin; sides with orange and red spots....BROWN TROUT p.35
- 5b. Spots well developed on caudal fin; orange and red spots absent; sides with longitudinal pinkish streak.....RAINBOW TROUT p.34
 - 6a. Caudal fin deeply forked; no red spots on sides.....LAKE TROUT p.37
 - 6b. Caudal fin not distinctly forked; red spots on sides.....BROOK TROUT p.36



TROUT, WHITEFISH, AND GRAYLING

Family Salmonidae

In Yellowstone this family which includes all the park sport fish is comprised of four subgroups: trout (cutthroat, rainbow, and brown), chars (brook and lake "trout"), whitefish, and grayling. The cutthroat trout can be further separated into two distinguishable forms. In addition, cutthroat will hybridize with rainbow trout, producing an intermediate form.

Body coloration and flesh color will vary with diet and the condition of the water. For example, cutthroat from Clear or Slough Creek are brightly colored, whereas those from Yellowstone or Heart Lakes may be dull. The flesh of cutthroat from Yellowstone Lake is almost always bright pink, a result of the principal diet consisting of fresh water shrimp, *Gammarus lacustris*. In contrast the flesh of fish in the Gardner River may be nearly white.

Members of this family characteristically change color during spawning activities, the male becoming brighter. The vertical bars or "parr marks" of young trout are lost before the fish becomes adult. General coloration, either external or internal, is not a reliable method of identifying trout.

CUTTHROAT TROUT — *Salmo clarki*

The cutthroat trout is native to the Rocky Mountains including the Yellowstone plateau. Deep red marks are present under the jaw giving it the appearance of a slashed throat, hence, "cutthroat."

Two distinguishable forms of cutthroat are native to the park. The Yellowstone cutthroat trout originally occurred in the Yellowstone, Madison, and Gallatin River drainages but has since been planted in the southern part of the park, which was originally inhabited by the Snake River cutthroat. It has larger, less numerous spots than the Snake River form.

The Snake River cutthroat trout is limited to the Snake River drainage in the southern third of the park. Cutthroats never were able to ascend the Lewis River beyond the Lewis Canyon barrier, so Shoshone and Lewis Lakes were historically devoid of trout. This form differs from the Yellowstone cutthroat by having more numerous and smaller black spots.



YELLOWSTONE CUTTHROAT



SNAKE RIVER CUTTHROAT

Cutthroats spawn in rivers or streams from late May through mid-July. The average fish taken from Yellowstone Lake weighs about one pound and is 14 inches long. Good fighters, they can be taken on flies or spinning equipment. They are the most widely distributed and most abundant sport fish in the park.

Park Distribution:

Bechler River and tributaries
Beula Lake
Broad Creek
Cache Creek
Cascade Lake
Deep Creek
Falls River
Gallatin River and tributaries
Lower Gardner River
Heart Lake
Hellroaring Creek
Lamar River

Mallard Lake
Middle Creek
Pebble Creek
Riddle Lake
Slough Creek
Snake River
Soda Butte Creek
Tower Creek
Trout Lake
Yellowstone Lake
Yellowstone River and tributaries



RAINBOW TROUT — *Salmo gairdneri*

Rainbow trout, originally from the West Coast, were first introduced in Yellowstone Park in the Gibbon River in 1889. Body, head and fins are covered with numerous small black spots. The adipose fin is spotted or has a margin of black. A prominent pink or red band runs laterally down the side, thus the name "rainbow."

They spawn in the spring and often hybridize with the native cutthroat. In Yellowstone rainbow may attain a weight of more than 7 pounds, but a two-pound fish is a good catch here. They are readily caught on flies or spinning gear and are prized for their fighting ability, especially their habit of leaping from the water after being hooked.

Park Distribution:

Firehole River
Gallatin River
Gardner River
Gibbon River
Grebe Lake
Hellroaring Creek
Iron Creek
Lamar River

Little Firehole River
Madison River
Middle Creek
Nez Perce Creek
Slough Creek
Soda Butte Creek
Tower Creek
Trout Lake
Yellowstone River

HYBRID TROUT — *Salmo clarki* x *Salmo gairdneri*

The cutthroat-rainbow trout hybrid normally has the pinkish side stripe and white-edged anal fin of the rainbow and a faded version of the red jaw slash of the cutthroat.

Introductions of rainbow trout into certain waters containing native populations of cutthroat trout has resulted in the demise and dilution of the pure cutthroat trout populations. Rainbow tend to become the dominant fish after continued hybridization. Mariposa Lake is a good example of rainbow dominance; on the other hand, rainbow trout stocked in Yellowstone River in 1908 are believed to have been absorbed by the large and dense population of cutthroat trout.

Hybrid trout are abundant in Grebe and Mariposa Lakes, the Lower Yellowstone River, and Falls River below Cave Falls. Trout Lake has populations of cutthroat and rainbow trout, and studies indicate some degree of hybridization.



BROWN TROUT — *Salmo trutta*

The brown or loch leven trout, native to Europe, was first introduced into the park in 1890 in Lewis and Shoshone Lakes. It is brownish, and the tail is without black spots or with only a few along the upper margin. Sides have red spots sometimes interspersed with black spots. Spots are ringed with white or pale pink. The adipose has an orange tip.

In Yellowstone they may reach a weight of six pounds or more in exceptionally good environments where forage fish

are abundant; one to two pounds is considered a good stream catch. Browns are the most predaceous of the trout. After attaining a length of 10 to 12 inches, they will feed almost entirely on forage fish if available. They are fall spawners, from October through February; their abundance and large size in the Firehole, Madison, and Lewis Rivers make these popular fall fishing streams. Browns are exceptional fighters, especially the larger ones, and they are tasty.

Brown trout have adapted to a wider variety of Yellowstone waters than the other introduced fish, probably due to their wide range of temperature tolerance and diverse feeding habits.

Park Distribution:

Cougar Creek
Duck Creek
Firehole River
Gardner River below falls
Gibbon River
Grayling Creek
Iron Creek
Lewis Lake

Lewis River
Madison River
Nez Perce Creek
Sentinel Creek
Shoshone Lake
Shoshone Creek
Snake River
Lower Yellowstone River



BROOK TROUT — *Salvelinus fontinalis*

Brook trout, native to the eastern United States and Canada, were introduced into park waters in 1889 in the upper Gardner and Firehole Rivers. Absence of black spots, a vivid white border on the front edges of the lower fins, the light "worm tracks" on a dark upper body, and red spots on the sides distinguish the brook trout from other members of the family.

Small, cold streams are especially suited to brook trout requirements, but in some areas they directly compete with the native cutthroat for food. When water temperatures become lower during October and November, brook trout move upstream and spawn in water where the bottom is gravelly.

The average size of fish is eight inches; however, in large streams and lakes a length of 18 inches and three pounds weight is not uncommon.

Park Distribution:

Blacktail Deer Creek
Blacktail Ponds
Upper Firehole River
Gardner River
Gibbon River
Glen Creek
Grizzly Lake
Indian Creek

Upper Lava Creek
Lost Creek
Lupine Creek
Obsidian Creek
Sentinel Creek
Shoshone Lake and tributaries
Solfatara Creek
Tower Creek



LAKE TROUT — *Salvelinus namaycush*

The lake trout or mackinaw is a native to the Great Lakes region and most of Canada and Alaska. It was first planted in Yellowstone in Shoshone and Lewis Lakes in 1890. The lake trout has a deeply forked tail, large whitish spots on a dark gray background, and a lighter ventral color.

Lake trout are best suited to deep, cold water lakes containing abundant forage fish where they may reach a weight of more than 30 pounds. Lake trout come in from deep water to the shoal areas to spawn in October and November during

which time many are taken on large flies and spoons. They may be caught on trolling gear in deep water during the summer.

Park Distribution:

Heart Lake
Heart River
Lewis Lake

Lewis River
Shoshone Lake
Snake River



ARCTIC GRAYLING — *Thymallus arcticus*

The grayling is a native here but has the most limited distribution of any sport fish in the park. The grayling is generally trout-shaped but may be distinguished by its small mouth and large, brilliantly colored dorsal fin. It has larger scales than trout.

Although grayling have succeeded in several isolated lakes in the park, an inability to compete with other species gravely restricts their distribution. They are best suited to clear, cold streams and lakes with abundant plant life and stretches of gravel bottom. Spawning occurs in spring shortly after small tributary streams become free of ice.

Over the years grayling probably have been subjected to relatively more fishing pressure than any other fish in the park. Today skilled fly fishermen prize the capture and release of this fish as a rare wilderness species. In Yellowstone they average less than 12 inches long but individuals may reach a length of sixteen inches.

Park Distribution:

Cascade Lake
Gibbon River
Grebe Lake

Ice Lake
Madison River
Wolf Lake



MOUNTAIN WHITEFISH — *Prosopium williamsoni*

The mountain whitefish has a wide distribution throughout the Rocky Mountain Region and is native to Yellowstone, found mainly below the central plateaus. They are distinguished from the more rare grayling by the smaller dorsal fin and lack of black spots on the forward side of the body.

Mountain whitefish prefer the deeper pools in streams and may occur in lakes. Late in the fall they move out of the lakes to tributary streams and from the deep pools in streams to the riffle areas to spawn, depositing an average of 8,000 eggs per pound of female. As a result of the late spawning and the lowered winter stream temperatures the eggs may have an incubation period of more than five months, the fry emerging in March or April.

Mountain whitefish are late evening or night bottom feeders, but occasionally schools may be seen feeding on the surface during twilight hours. Primary food includes small caddis flies, midges, diptera larvae, and stonefly and mayfly nymphs. Whitefish are adept in capturing small free-floating animal life in the water.

Not always realized by anglers, they are an excellent sport fish. They average about 12 inches long and slightly over one-half pound, but weights up to four pounds have been reported. The flesh is white and firm.

Park Distribution:

Lower Firehole River
Gardner River (below falls)
Lower Gibbon River
Heart Lake

Lower Lewis River
Madison River
Snake River
Yellowstone River (below falls)

SUCKERS

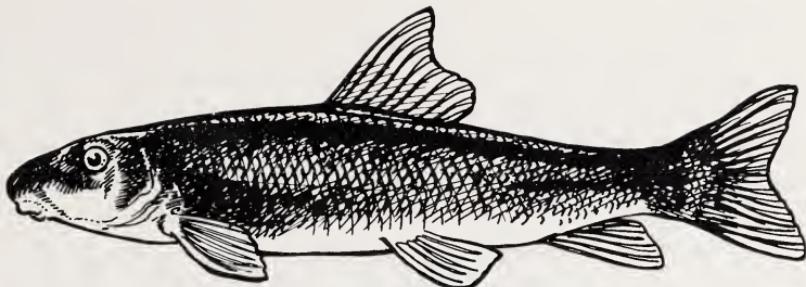
Family Catostomidae

Suckers are soft rayed fishes having a mouth without teeth and thick, fleshy lips. All suckers have large scales on their bodies but none on their heads, and they lack adipose fins. All the fins are without true spines.

Suckers are not as widely distributed in Yellowstone as they are in many mountain areas in the west. The three Yellowstone species are all principally bottom dwellers and seldom enter the catch. All Yellowstone suckers spawn in the spring.

KEY TO THE SUCKERS OF YELLOWSTONE

- 1a. Distinct notch at corner of mouth between upper and lower lip.....MOUNTAIN SUCKER p.41
- 1b. Corner of mouth between upper and lower lip without a notch..... 2
- 2a. 90-120 scales in lateral line; snout long and pointed.....LONGNOSE SUCKER p.42
- 2b. 60-75 scales in lateral line; snout shorter, more rounded.....UTAH SUCKER p.41

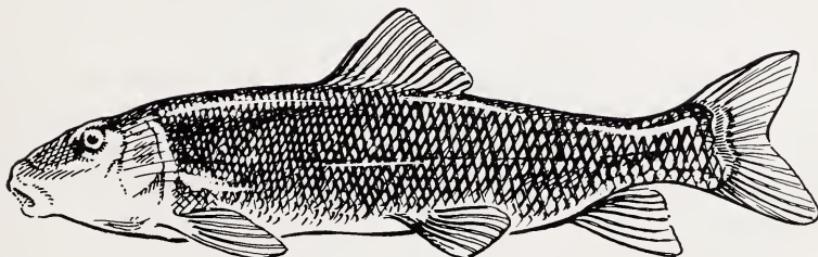


MOUNTAIN SUCKER — *Catostomus platyrhynchus*

The mountain sucker is darkish green above, finely speckled with black. As in other suckers the breeding males usually have a reddish lateral stripe on each side that runs from the tip of the snout to the middle of the tail base. Average length is under seven inches, but occasionally they may reach a foot.

This sucker has a wide native distribution, primarily in the clear streams of the Upper Missouri. In Yellowstone it occurs in the Yellowstone River drainage, including the Lamar River and Soda Butte Creek, and in the Snake River drainage.

The unusually long intestine in this species is an adaption to its primary diet of algae and slime. These fish prefer cold stream waters with a bottom of gravel, sand, or boulders. They are rarely encountered in lakes. Small size and frequency in shallow streams make them a valuable food source for predatory birds and trout.

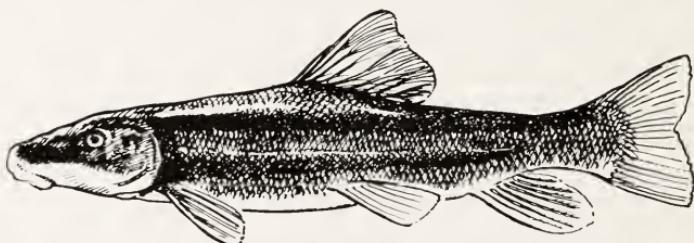


UTAH SUCKER — *Catostomus ardens*

This is the largest sucker in the park, attaining a length of 22 inches and weight of five pounds. It is dark brown above, light below, and has large scales but no overhanging snout.

The Utah sucker is native to the Snake River drainage above Shoshone Falls including Heart Lake and its tributaries; its distribution is limited to the western side of the Continental Divide. In Witch Creek, draining from Heart Lake Geyser Basin to the lake, it has been recorded in water temperatures above 80° F. Primarily a lake species, the largest concentration is in Heart Lake, although the young are frequently found in streams.

Trout, osprey, and other predatory birds often capture this fish for food. The sucker spawns in late spring, and its young can be seen in the shallows during early summer. Its chief food is algae, bottom insect larvae, and plankton.



LONGNOSE SUCKER — *Catostomus catostomus*

The body of the longnose sucker tapers into a snout that overhangs the ventral mouth, hence its name. Above the lateral line it is dusky-brown to almost black; below the color is light, fading to white on ventral parts. Average maximum length is about 17 inches, although 20-inch specimens have been taken.

In Yellowstone the longnose sucker is found in the lower Yellowstone River, Gardner River, Slough Creek, Yellowstone Lake, Pelican, Cub and Clear Creeks, and other tributaries to Yellowstone Lake. They have been observed in the Yellowstone River and in most of the shallow bays around the lake.

Unfortunately the longnose sucker was probably introduced into Yellowstone Lake in the early 1930's by fishermen who employed them as live bait. This case of an introduction of an exotic species into a primitive environment points out the need for fishing regulations prohibiting use of live bait. Cutthroat trout in Yellowstone Lake seldom utilize the longnose sucker as food.

MINNOWS

Family Cyprinidae

In Yellowstone this group is represented by five species, two of which, the lake chub and the redside shiner, have a very limited distribution. Their habit of utilizing minute animal and plant life and their importance as food to predatory fishes and birds make them an important link in Yellowstone's aquatic food chain.

KEY TO THE MINNOWS OF YELLOWSTONE

1a. Large (adults over 7 inches); body robust; scales large; occurs only in Snake River Drainage..... UTAH CHUB p.47

1b. Small (less than 7 inches); body not robust..... 2

2a. Upper lip continuous with skin on top of head..... 3

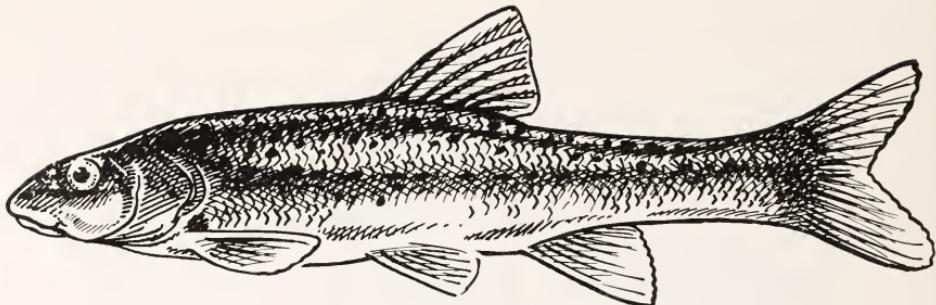
2b. Upper lip not continuous with skin on top of head..... 4

3a. Snout overhanging mouth..... LONGNOSE DACE p.44

3b. Snout not overhanging mouth; occurs only in Snake River Drainage..... SPECKLED DACE p.44

4a. 10-13 rays in anal fin; forehead rounded..... REDSIDE SHINER p.46

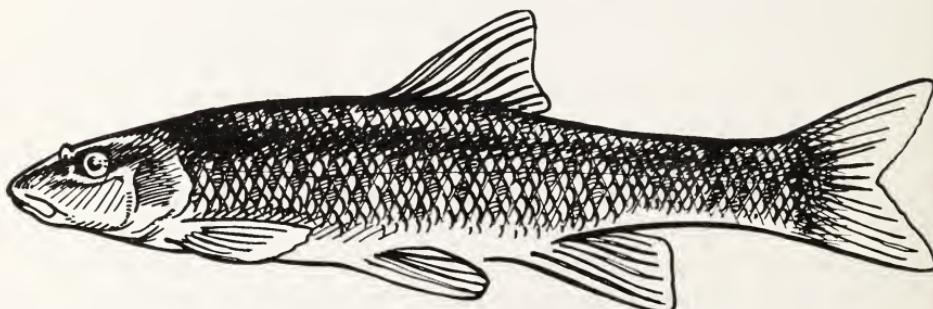
4b. 8 rays in anal fin; forehead flat; occurs only in Yellowstone Lake (rare)..... LAKE CHUB p.45



SPECKLED DACE — *Rhinichthys osculus*

Blotches and specks of darker color on a gray background give the speckled dace, smallest of the park fishes, its name. Averaging two to three inches, it seldom exceeds four inches long.

Its habits are similar to the longnose dace but it prefers the swift waters and riffle areas of smaller streams. It spawns in spring and early summer and inhabits waters varying widely in temperature; it has been taken from the thermal waters of Witch Creek which often reach 80° F. The speckled dace serves as a valuable, native link in the food chain for trout in the Snake River and its tributaries, including the Falls River. This species is not found on the eastern side of the Continental Divide.



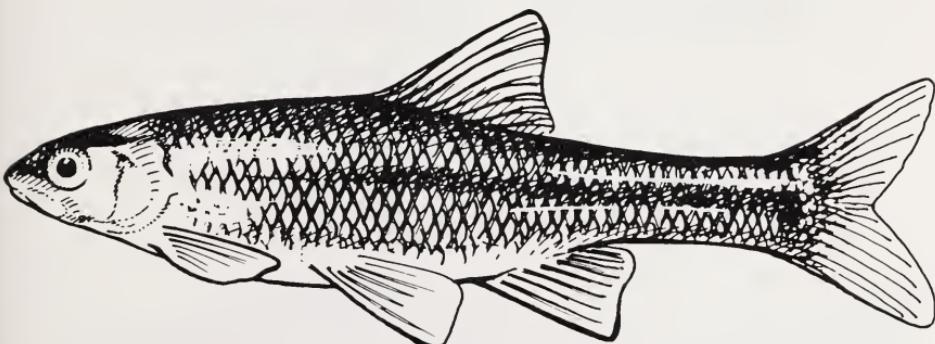
LONGNOSE DACE — *Rhinichthys cataractae*

The longnose dace is greenish-brown to dusky with lighter, sometimes silvery, sides. A narrow black stripe usually

extends from the tip of the snout to the eye. Males in the spring have orange-red lips and head underparts, pinkish fins, and a leaner body. Five inches is about maximum length.

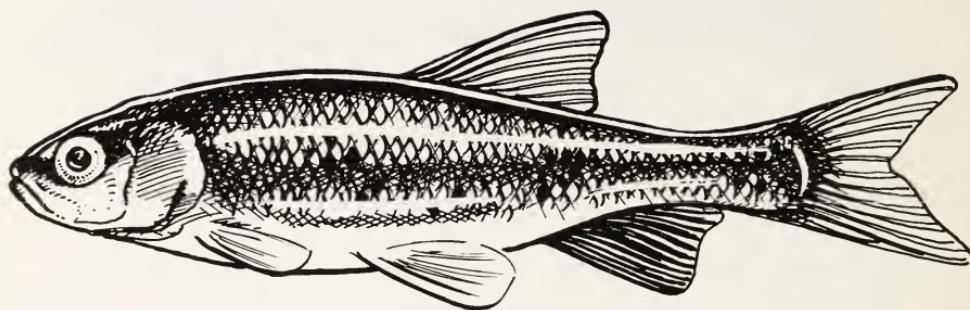
The longnose dace is fairly common in Yellowstone streams, occurring naturally on both sides of the Continental Divide. It is present in the tributaries to Yellowstone Lake, the Yellowstone, Gardner, Madison, Lamar, and Falls Rivers, and the Snake River drainage. In 1967 longnose dace were collected in the swift waters of the Yellowstone River Canyon seven miles below the falls.

It prefers the swifter parts of the water, especially gravel riffles. This fish is omnivorous, feeding on algae, small snails, crustaceans, insect larva, and other aquatic organisms. It spawns in the spring or early summer on sand and gravel bottom.



LAKE CHUB — *Semotilus plumbeus*

The lake chub is a silvery-blueish minnow, averaging three to six inches long. Probably introduced by bait fisherman around 1947, it was first reported in Yellowstone Lake in 1958 and collected again in 1968. This fish has not been reported elsewhere in the park and has declined in number in Yellowstone Lake where it is now very rare.



REDSIDE SHINER — *Richardsonius balteatus*

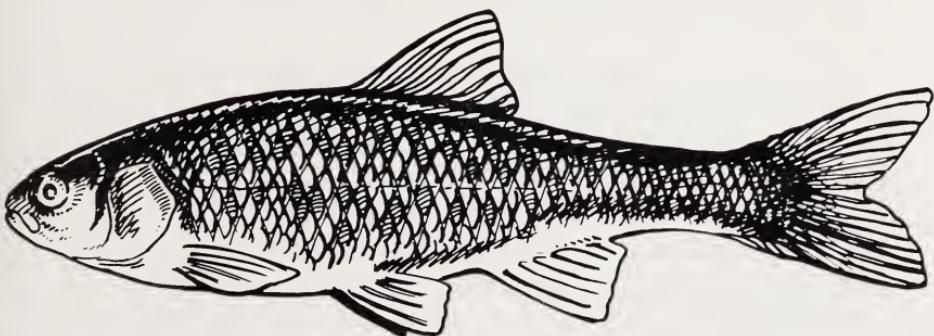
These are blueish fish with silvery sides and black lateral bands. In males there is a red stripe below the black lateral band, hence its common name. The shiner attains a length of five and one-half inches but averages three to five inches.

The redside shiner is a native fish in the Snake River and its tributaries. Some time prior to 1958 it was introduced, probably by bait fishermen, to Yellowstone Lake where it has rapidly multiplied and is now found along the entire shoreline. Redsides travel in schools, and large numbers have been observed around the Bridge Bay Marina since 1963. In 1968 an extremely heavy spawning run was observed during fish trap operations on Pelican Creek in late June. They prefer the warmer water found in quiet, shallow lagoons.

UTAH CHUB — *Gila atraria*

The Utah chub is the largest cyprinid found in Yellowstone, reaching a length of 18 inches; however, average specimens from Lewis and Heart Lakes are closer to ten inches. They are blackish fish with finely spotted scales. Native chubs are abundant in the upper Snake River tributaries, Heart Lake and the 80° F. water of Witch Creek. They recently have been introduced, probably by bait fishermen, into Lewis and Shoshone Lakes.

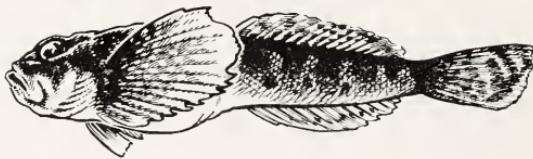
Utah chubs provide a chief source of food for lake trout. They spawn in the spring and are omnivorous, including terrestrial and aquatic insects, plants, algae, and crustaceans in their diet. Chubs can be caught on flies near the entrance of Witch Creek into Heart Lake, and occasionally one will enter a fisherman's catch on Lewis Lake.



SCULPINS

Family Cottidae

One species is found in Yellowstone water. These fish live in small, rapid streams and on both sides of the Continental Divide. They are small and are seldom observed by the angler as they never appear in a catch.



MOTTLED SCULPIN — *Cottus bairdi*

This sculpin is blueish or brownish-gray, mottled irregularly with blotches of brown or black, with numerous minute black dots and a dark bar at base of the tail. The upper edge of the front dorsal fin is fringed with orange. It attains a maximum length of five to six inches.

The mottled sculpin is native to the Madison, Gallatin, and Gibbon Rivers, Slough Creek, and the Snake River drainage including the Bechler River. The sculpin feeds on bottom dwelling larvae, crustaceans, snails, some vegetable matter, and occasionally small fishes. It provides a valuable food item for large trout, often being found in their stomachs.

Highly protective of their eggs which are deposited in spring, male sculpins guard the nest in which the eggs are suspended on the underside of logs or stones.

GLOSSARY OF TECHNICAL TERMS

Adipose fin—A fleshy, rayless fin on the midline of the back behind the dorsal fin of trout, grayling, and whitefish.

Anal fin—The single fin on the median line behind the anus.

Carnivorous—Flesh eating.

Caudal—Pertaining to the tail.

Dorsal fin—The large fin on the backs of fishes.

Exotic—Non-native.

Fauna—The animal life of a region.

Forage fish—The group of fishes that provide food for sport fish (in Yellowstone all non-sport fish).

Herbivorous—Eating plants.

Hybrid—An organism produced by crossing of two species.

Lateral line—A series of sense organs forming a line along the side marked by holes in the scales, or, when scales are absent, by pits in the skin.

Omnivorous—Diet consisting of both plants and animals.

Pectoral fin—the anterior or uppermost of the paired fins.

Ray—One of the cartilaginous rods which support the membrane of a fin.

Species—The lowest unit of formal classification commonly used.

Spine—Any sharp projecting point; those fin rays which are not branched and usually more or less stiffened.

Variety—Variation within a species (also form).

Ventral—Pertaining to the under parts.

